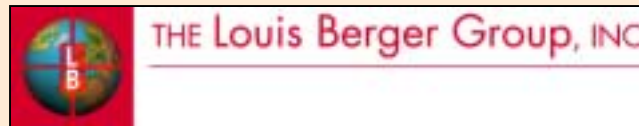


**Segment 1426 of the Colorado River
Chloride, Sulfate, Total Dissolved Solids
Total Maximum Daily Load Development**

Ballinger, Texas

**Meeting #1
December 10, 2003**



Objectives

- To explain the TMDLs: What is? Why? Which segment? How?
- To present and review the steps and the data used in the development of the TMDL for the listed segment 1426 of the Colorado River.

Why Develop TMDLs?

Requirements of 1972 Clean Water Act:

- States are required to identify impaired waters
- Section 303(d) of the Clean Water Act:
 - Requires states to periodically list impaired waters
 - Requires TMDLs development for impaired waters

EPA in litigation for failure to promulgate Section 303(d) of the Clean Water Act.

What is a TMDL?

- A TMDL (Total Maximum Daily Load) establishes the maximum amount of an impairing substance or stressor that a waterbody can assimilate and still meet Water Quality Standards and allocates that load among pollution contributors.
- TMDLs are a tool for implementing State water quality standards. They are based on the relationship between pollution sources and in-stream water quality conditions.
- A TMDL addresses a single pollutant or stressor for each waterbody.

Which Waterbodies Require TMDLs?

Waterbodies require TMDLs when the pollution control requirements are not stringent enough to meet applicable Water Quality Standards.

How are TMDLs Calculated?

- A TMDL is the sum of the allowed pollutant loads for point sources, non-point sources, a margin of safety, and projected growth.
- $\text{TMDL} = \text{Point Sources} + \text{Nonpoint Sources} + \text{Margin of Safety}$

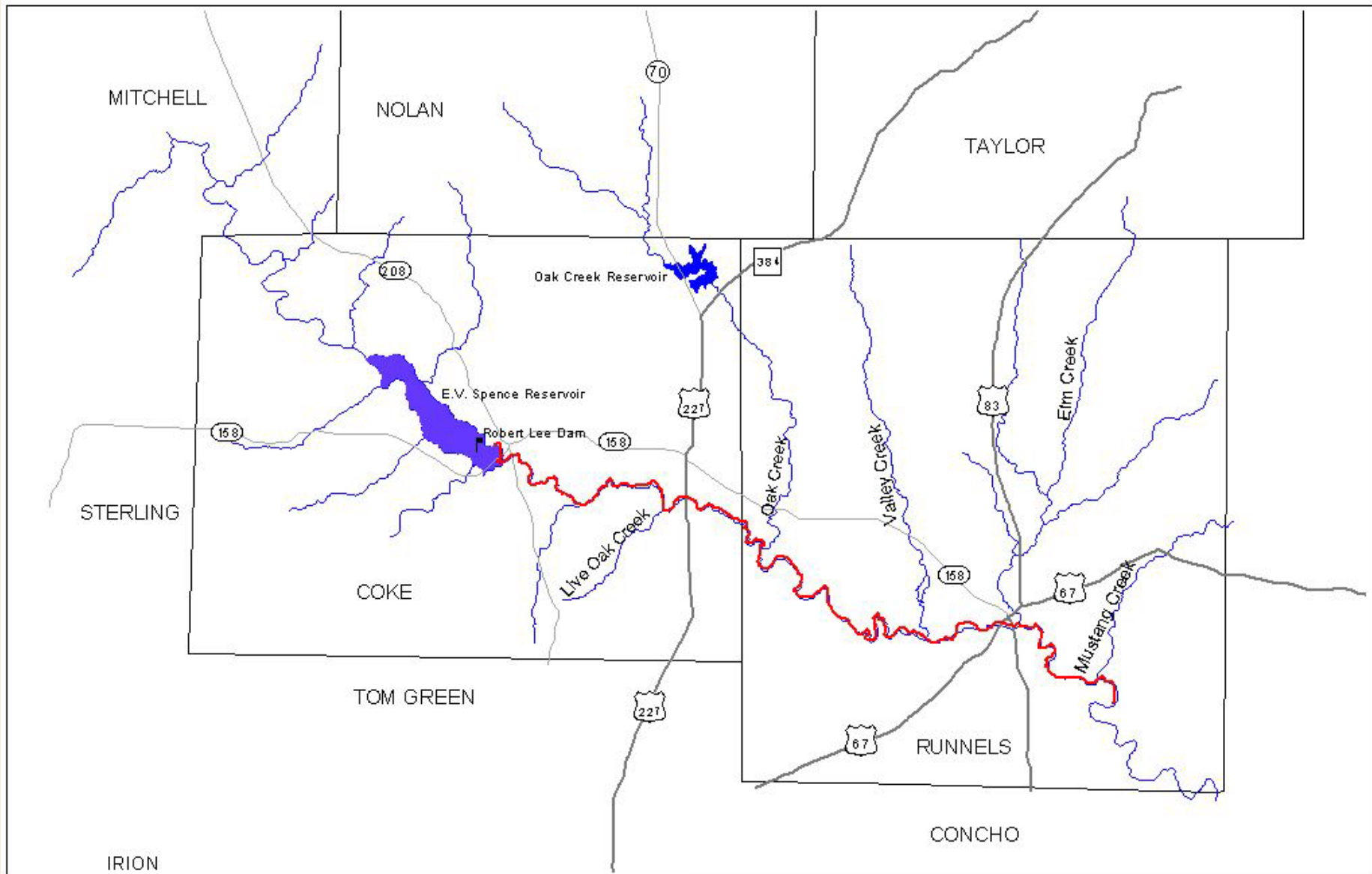
TX Water Quality Standards

- Chloride, Sulfate, Total Dissolved Solids Impairment
- Appendix A: Water Uses and Numeric Criteria
 - Chloride = 610 mg/L
 - Sulfate = 980 mg/L
 - Total Dissolved Solids = 2,000 mg/L

What is a TMDL?

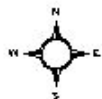
A Special Study to:

- Identify the sources of pollution contributing to violation of water quality standards.
- Calculate the amount of pollutant loads entering the stream from each source.
- Calculate the reductions in pollutant loads, by source, needed to attain/maintain the water quality standards.
- Must include a margin of safety.



- Dam
- Streams
- Listed Segment #1426
- Streams
- County Boundaries
- Roads

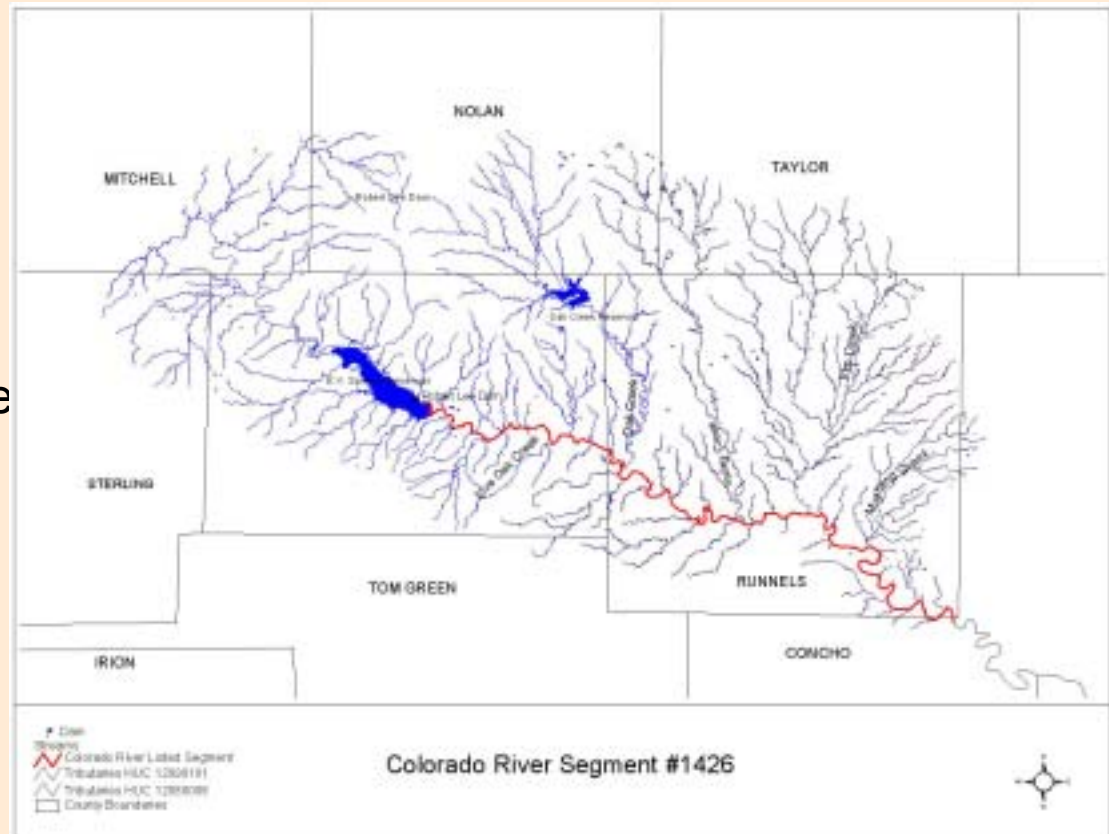
Colorado River Segment #1426



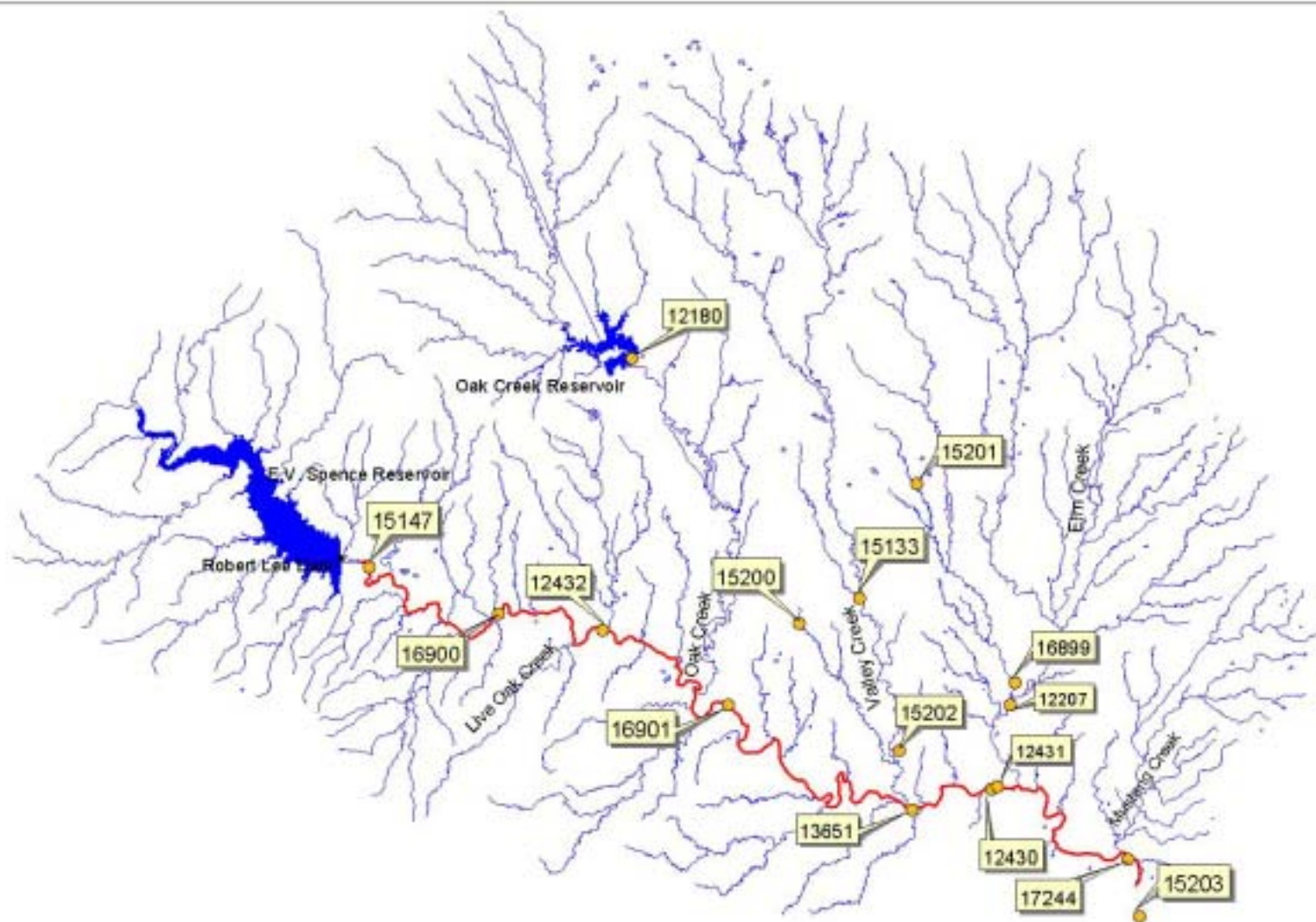
Colorado River Listed Segment

Based on the 2000 303(d) List

- Upstream Limit:
 - Robert Lee Dam
- Downstream Limit:
 - A point 2.3 miles below Mustang Creek Confluence
- Segment Length:
 - 66 miles



Environmental Monitoring



Colorado River Segment #1426
Water Quality Monitoring Stations

Summary of Water Quality Conditions: Chloride

Station	Period of Record	# of Samples	No. of violations	Percent of time exceed the standard
12169	Jan 98 - Oct 03	13	0	0.0
12180	Jul 98 - Dec 99	5	0	0.0
12207	Jan 96 - Oct 03	34	0	0.0
12430	Feb 96 - Oct 03	49	30	61.2
12431	Feb 95 - Oct 03	16	6	37.5
12432	Feb 96 - Oct 03	52	49	94.2
13561	Jan 95 - Oct 03	108	50	46.3
15147	Feb 96 - Oct 03	59	57	96.6
15200	Oct-03	1	0	0.0
15535	Dec-95	1	0	0.0
15536	Dec 95 - Feb 01	16	0	0.0
16899	Jan 03 - Oct 03	6	0	0.0
16900	Jan 01 - Mar 01	3	3	100.0
16901	Jan 01 - Mar 01	3	3	100.0
17244	Jan 01 - Oct 03	9	6	66.7
17654	Aug-03	2	0	0.0
17655	Aug-03	2	0	0.0
17656	Aug-03	2	0	0.0
17657	Aug-03	2	2	100.0

Summary of Water Quality Conditions: Sulfate

Station	Period of Record	# of Samples	No. of violations	Percent of time exceed the standard
12169	Jan 98 - Feb 01	11	0	0.0
12180	Jul-98	1	0	0.0
12207	Jan 97 - Feb 01	22	1	4.5
12430	Jan 97 - Mar 01	31	13	41.9
12431	Feb 95 - Jun 97	10	3	30.0
12432	Jan 97 - Mar 01	33	13	39.4
13561	Jan 95 - Mar 01	87	35	40.2
15147	Jan 97 - Jan 01	42	11	26.2
15535	Dec-95	1	0	0.0
15536	Dec 95 - Feb 01	16	0	0.0
16900	Jan 01 - Mar 01	3	0	0.0
16901	Jan 01 - Mar 01	3	0	0.0
17244	Jan 01 - Mar 01	3	0	0.0

Summary of Water Quality Conditions: TDS

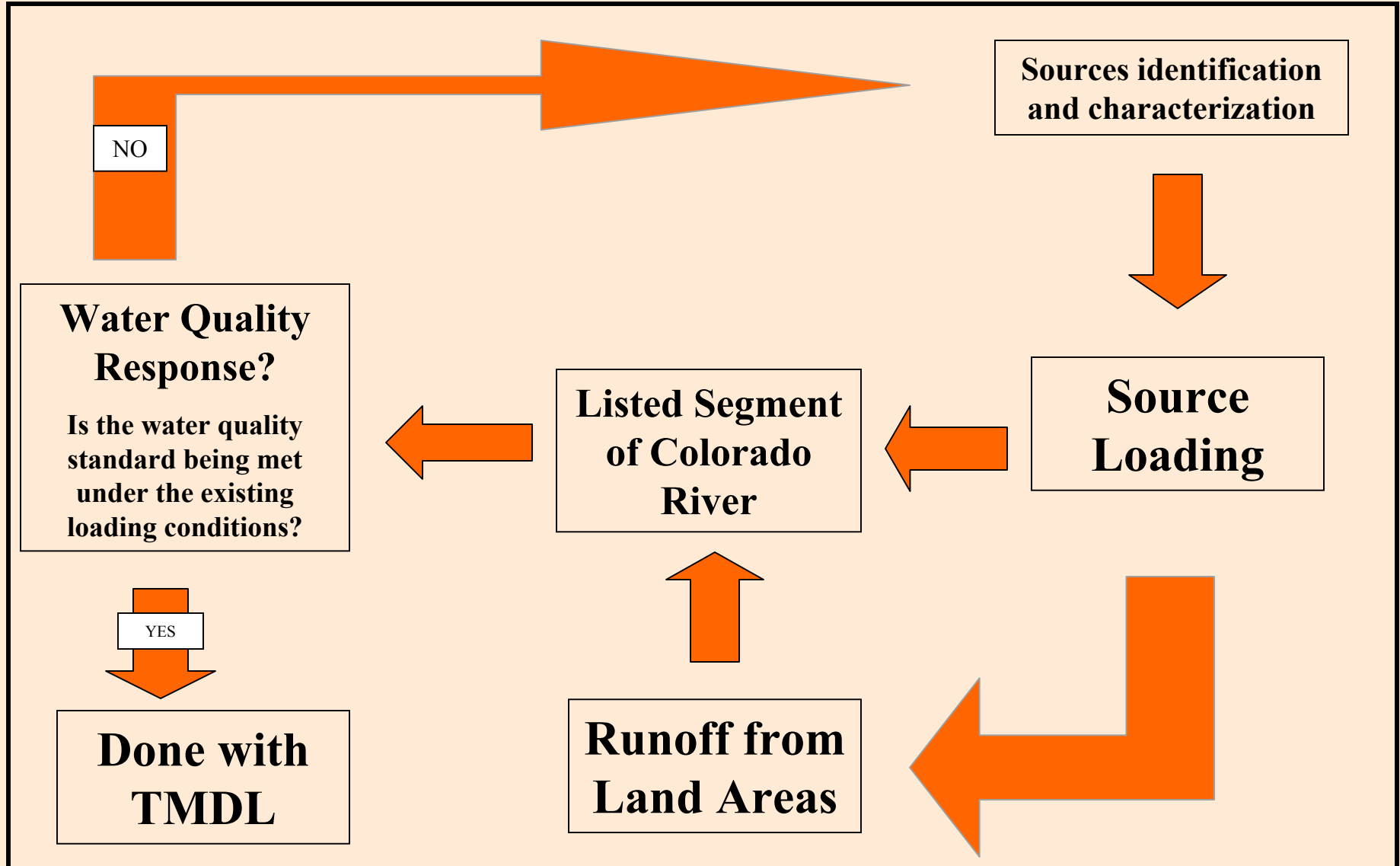
Station	Period of Record	No. of Samples	No. of violations	Percent of time exceed the standard
12169	Jan 98 - Oct 03	21	0	0.0
12207	Jan 96 - Oct 03	35	1	2.9
12430	Feb 96 - Oct 03	55	34	61.8
12431	Jan 03 - Oct 03	6	5	83.3
12432	Feb 96 - Oct 03	58	53	91.4
13651	Feb 96 - Oct 03	70	35	50.0
15147	Feb 96 - Oct 03	45	42	93.3
15200	Oct-03	1	0	0.0
15536	Jan 98 - Oct 01	17	0	0.0
16899	Jan 96 - Oct 03	38	3	7.9
16900	Feb 96 - Oct 01	48	47	97.9
16901	Feb 96 - Oct 01	52	50	96.2
17244	Jan 96 - Oct 03	55	29	52.7
17474	Jan 96 - Oct 01	31	1	3.2
17475	Feb 96 - Oct 01	50	50	100.0
17654	Aug-03	2	0	0.0
17655	Aug-03	2	0	0.0
17656	Aug-03	2	0	0.0
17657	Aug-03	2	0	0.0

TMDL Process

TMDL Development Process

1. Define the problem
2. Define the numeric targets for the pollutant
3. Identify and characterize pollutant sources
4. Estimate loadings under the existing conditions
5. Evaluate the linkage between the pollutant sources and instream response
6. Develop allocation scenarios that meet the water quality standards
7. Develop a follow up monitoring plan
8. Develop an implementation plan

TMDL Process



Data and Information Needs...

- Watershed Physiographic data
- Hydrographic data
- Weather data
- Watershed activities/use data and information related to **pollutant** production
- Point sources and direct discharge data and information
- Environmental Monitoring data
- Stream Flow data

Data Inventory

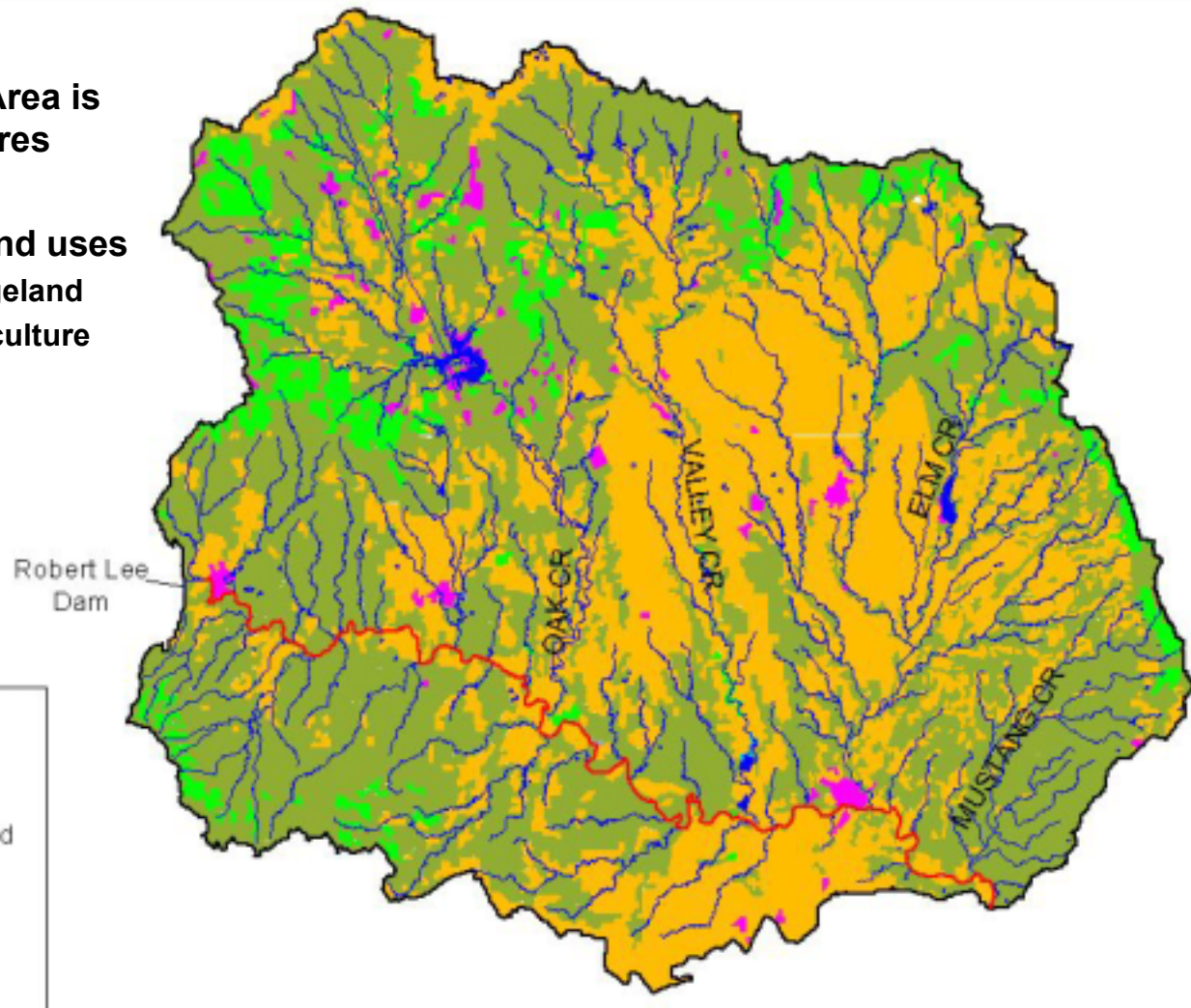
Data Category	Description	Potential Source(s)
Watershed physiographic data	Watershed boundary	USGS, TCEQ
	Land use/land cover	BASINS, MRLC, NLCD, TCEQ
	Soil data (SSURGO, STATSGO)	USDA, NRCS
	Topographic data (USGS-30 meter DEM, USGS Quads)	USGS, TCEQ
Hydrographic data	1. Stream network and reaches (RF3)	BASINS, TCEQ, Field determination
	2. Stream channel morphology	
Weather data	Hourly meteorological conditions	NOAA NCDC, Earth Info, local airports, weather stations, and colleges and universities
Watershed activities/ uses data and information related to pollutant Production	Compile information, data, reports, and maps that can be used to support CL, TDS and Sulfate source identification and loading. Address the following issues:	TCEQ, River Authorities, TSSWCB, RRC, and other State, County and Local agencies
	▪ Leaking oil wells	
	▪ Brine Pits	
	▪ Brine injection	
	▪ Phreatophytic Brush	
	▪ Salt deposits (geological source)	
Point sources and direct discharge data and information	Permitted facilities locations and discharge monitoring reports (DMR)	US EPA Permit Compliance System (PCS), TCEQ
Environmental monitoring data	Station locations and ambient instream monitoring data	TCEQ, Monitoring Plan, River Authorities
Stream flow data	Gaging station location and continuous flow data	USGS, TCEQ, River Authorities

Watershed Physiographic Data:

Description	Potential Source(s)
Watershed boundary	USGS, TCEQ
Land use/land cover	USGS, TCEQ
Soil data (SSURGO, STATSGO)	USDA, NRCS
Topographic data (USGS-30 meter DEM, USGS Quads)	USGS

Colorado River-Segment 1426

- **Watershed Area is 1,100,000 acres**
- **Dominant land uses**
 - 53% Rangeland
 - 39% Agriculture



Colorado River (Segment Number 1426)
Land Use/Land Cover

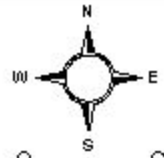
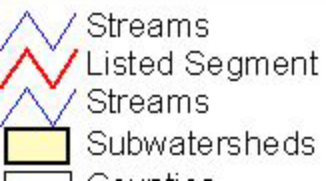


Segment 1426 Land Use Data

Land Use		Acres	Percent	Total Percent
Urban	RESIDENTIAL	4,756	0.4	1.4
	COMMERCIAL AND SERVICES	1,133	0.1	
	INDUSTRIAL	7,811	0.7	
	TRANS, COMM, UTIL	903	0.1	
	MXD URBAN OR BUILT-UP	129	0.0	
	OTHER URBAN OR BUILT-UP	612	0.1	
Agricultural	CROPLAND AND PASTURE	441,750	39.0	39.0
	ORCH,GROV,VNYRD,NURS,ORN	124	0.0	
	CONFINED FEEDING OPS	41	0.0	
	OTHER AGRICULTURAL LAND	49	0.0	
Rangeland	HERBACEOUS RANGELAND	28,998	2.6	53.4
	SHRUB & BRUSH RANGELAND	305,552	26.9	
	MIXED RANGELAND	271,248	23.9	
Forest	DECIDUOUS FOREST LAND	2,867	0.3	5.9
	EVERGREEN FOREST LAND	347	0.0	
	MIXED FOREST LAND	63,727	5.6	
Water	RESERVOIRS	3,034	0.3	0.3
Wetland	NONFORESTED WETLAND	388	0.03	0.03
Barren	STRIP MINES	266	0.02	0.03
	TRANSITIONAL AREAS	92	0.01	
	Total	1,133,827	100	100

Hydrographic data:

Description	Potential Source(s)
Stream network and reaches (RF3)	BASINS, NHD, TCEQ
Stream Channel Morphology	Field Survey



12 Miles

Weather data:

Description	Potential Source(s)
Hourly meteorological conditions	NOAA NCDC, Earth Info, local airports and weather stations.

Watershed activities/uses data and information related to Chloride and Sulfate production:

Compile information, data, reports, and maps that can be used to support the source identification and loading.

Address the pollutant loading from the following:

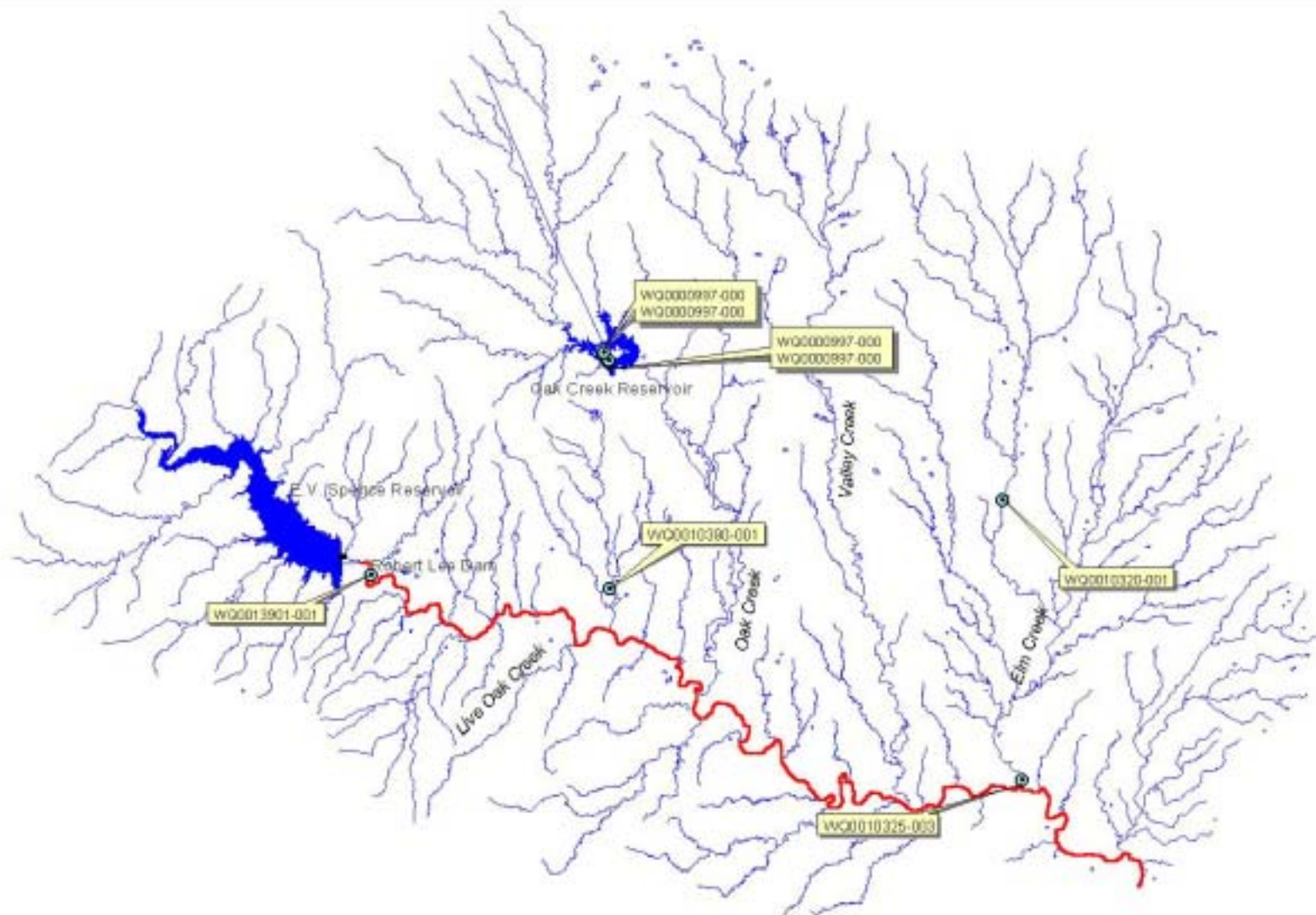
- Human Sources
 - Permitted Sources (facilities, brine pits and injection, leaking wells)
- Natural Sources
 - Geologic Formations
 - Biological Sources

Potential Sources Characterization

Source	Receiving Water				Response
	Surface Water		Groundwater		
	Direct	Indirect	Shallow	Deep	
Permitted Point source	X				F
Brine Pit		X			F
			X		M
Leaking oil well			X		M
Brine Injection			X		M
				X	S
Phreatophytic Brush		X	X		M
Salt Deposits		X	X		M

Point sources and direct discharge data and information:

Description	Potential Source(s)
Permitted facilities locations and discharge monitoring reports (DMR)	US EPA Permit Compliance System (PCS), Texas Pollutant Discharge Elimination System (TPDES), TCEQ



- Dam
- Permitted Point Sources
- Listed Segment #1426
- Streams

Colorado River (Segment 1426) Permitted Point Sources

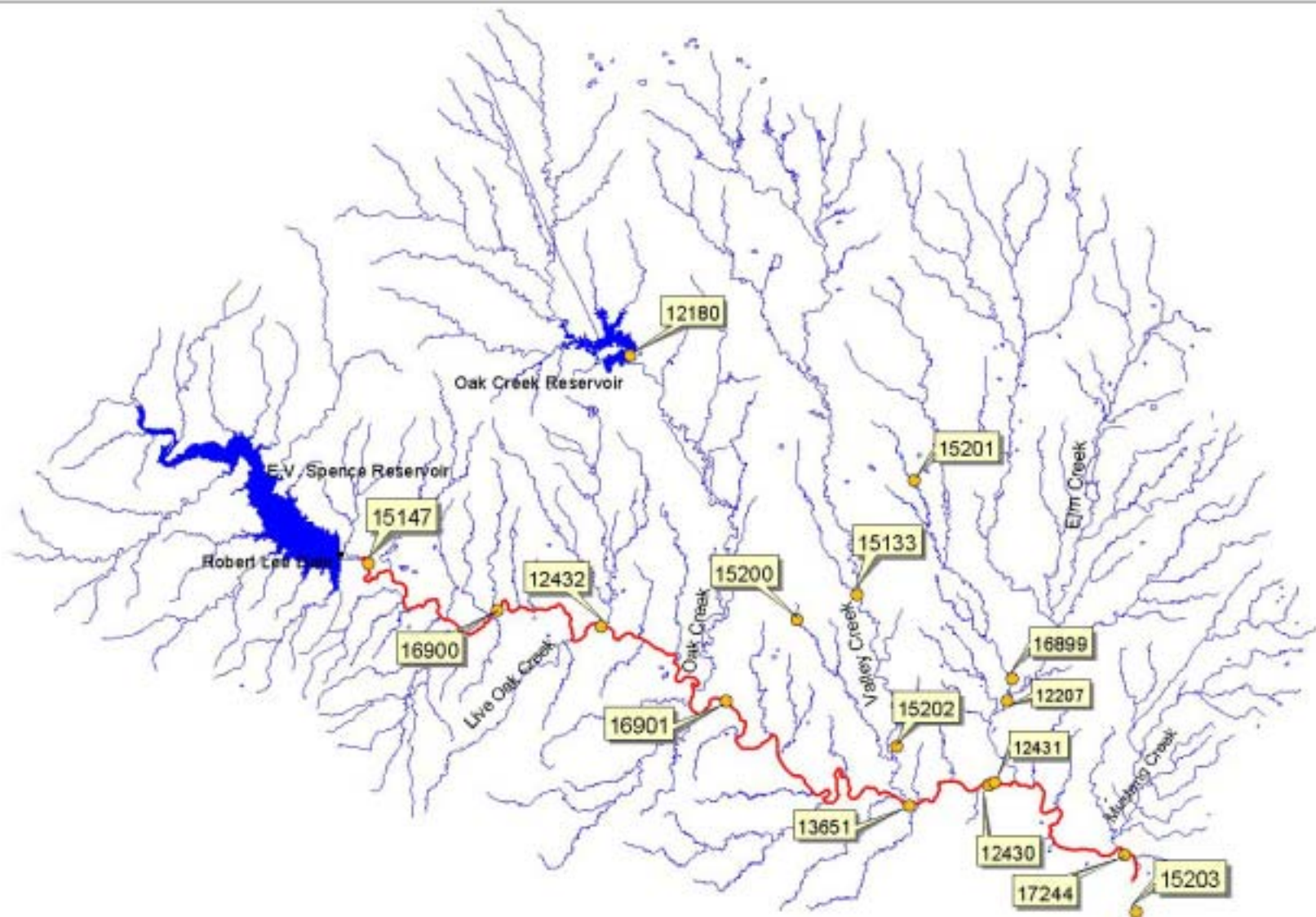


Environmental monitoring data:

Description	Potential Source(s)
Station locations and ambient instream monitoring data	TCEQ
	TCEQ
Special Studies	Colleges and universities, Local project surveys, Local knowledge based on communications with local groups and stakeholders

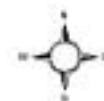
Water Quality Data Analysis

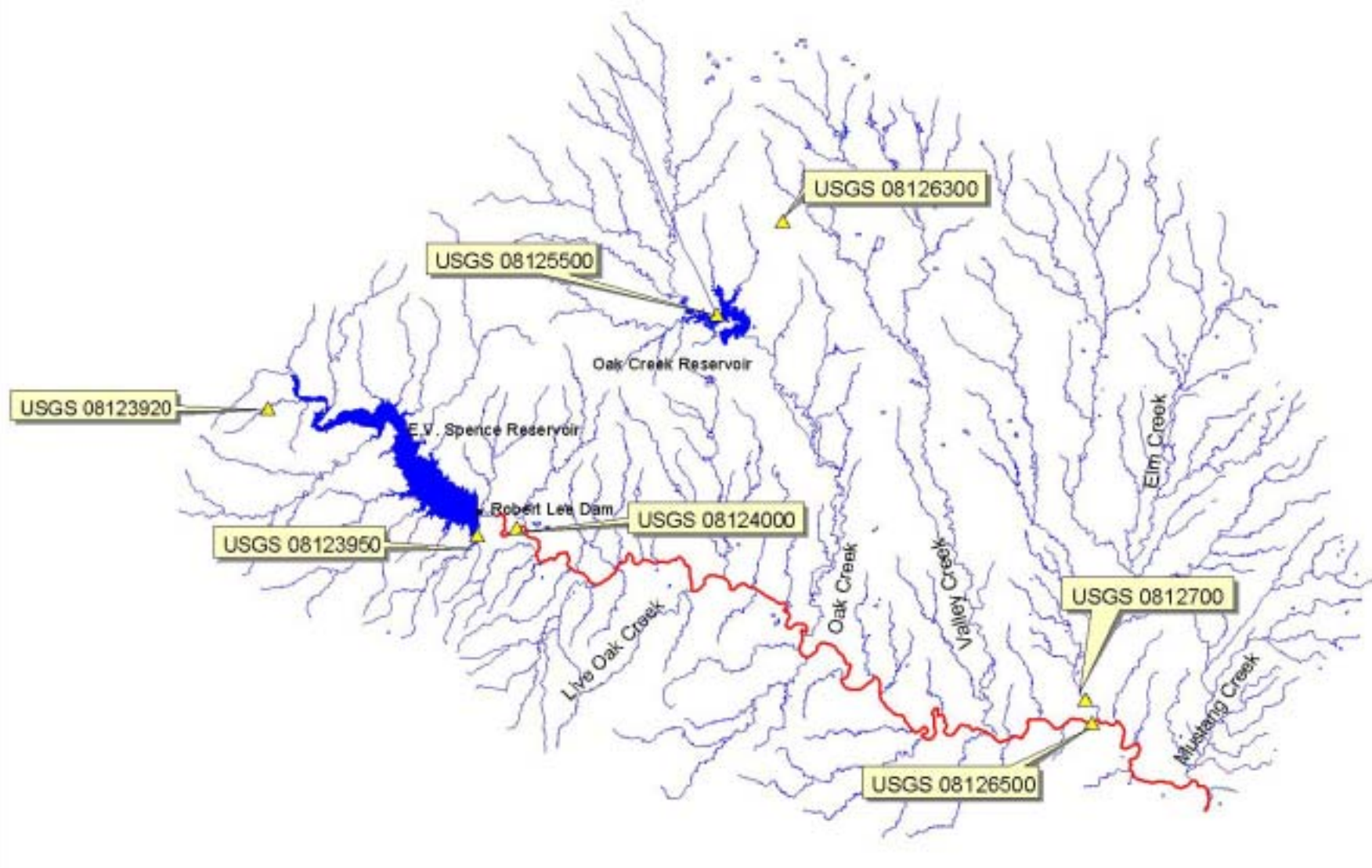
- Locations of sources and WQ Stations
- Data Analysis
 - Flow and pollutants relations and trends



- Dam
- Monitoring Stations
- Listed Segment #1426
- Streams

Colorado River Segment #1426
Water Quality Monitoring Stations





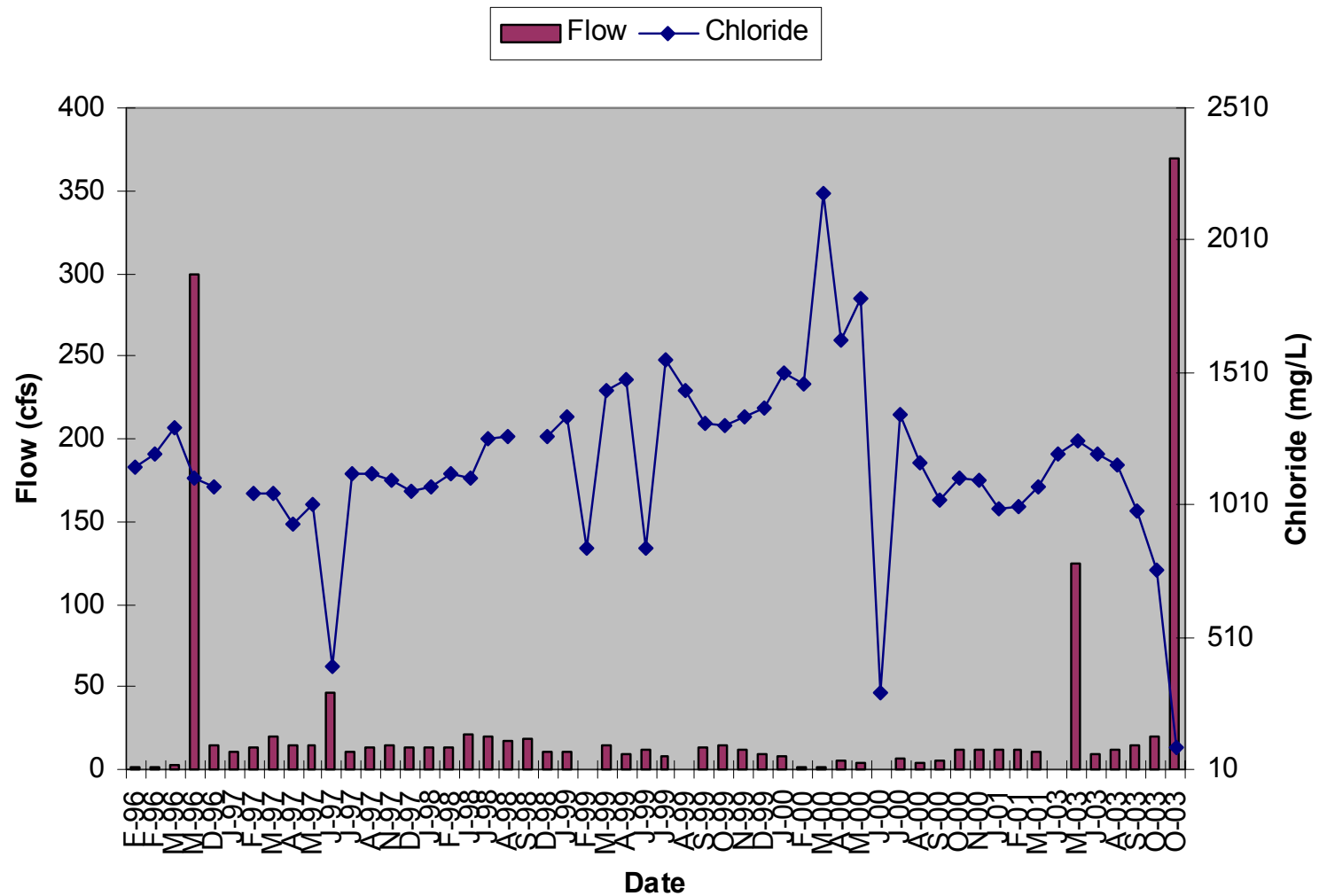
■ Dam
▲ USGS Stations
Streams
Used Segment #1426
Streams

4 0 4 8 Miles

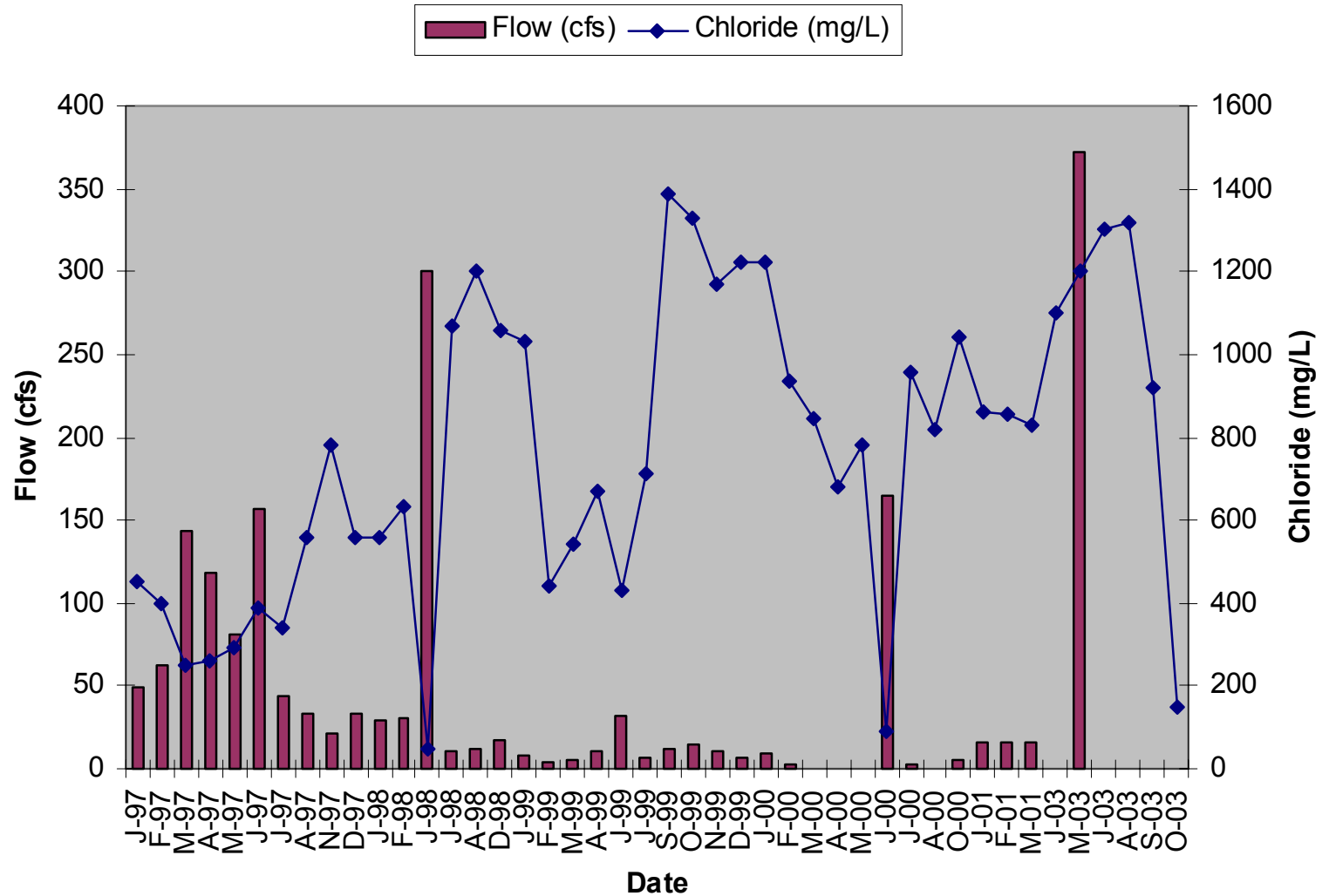
Colorado River Segment #1426
USGS Flow Monitoring Stations



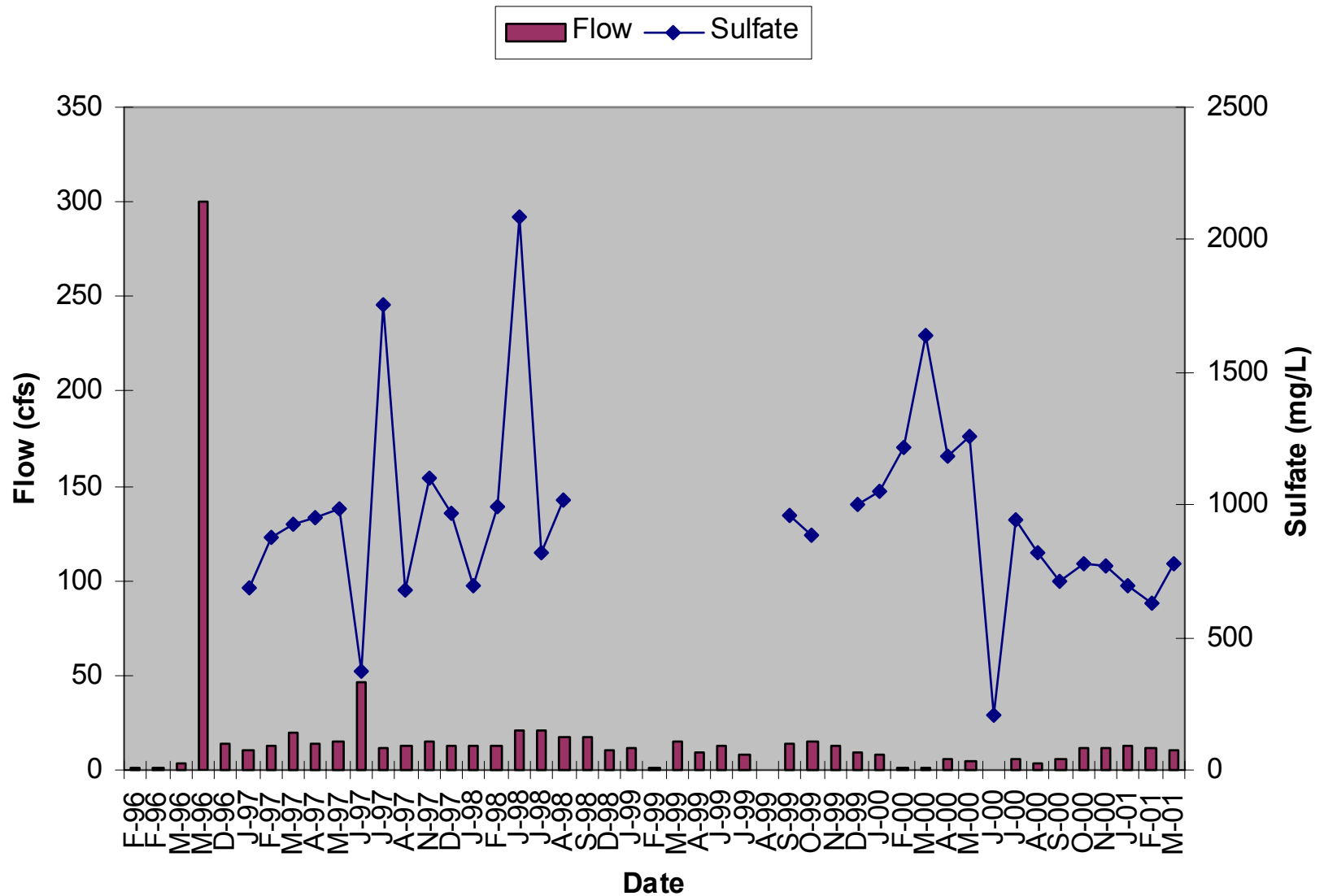
Colorado River (Station 12432)



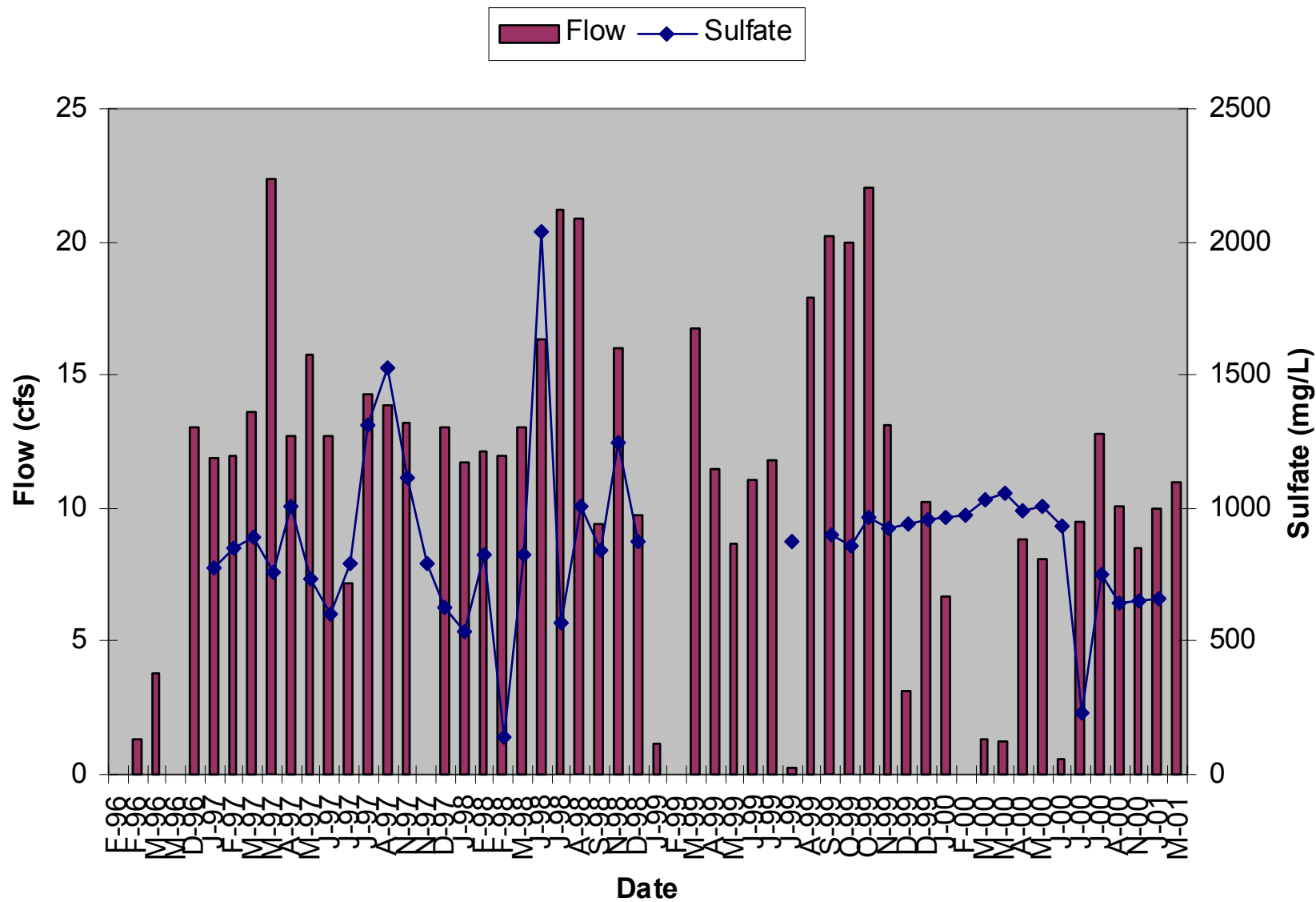
Colorado River (Station 12430)



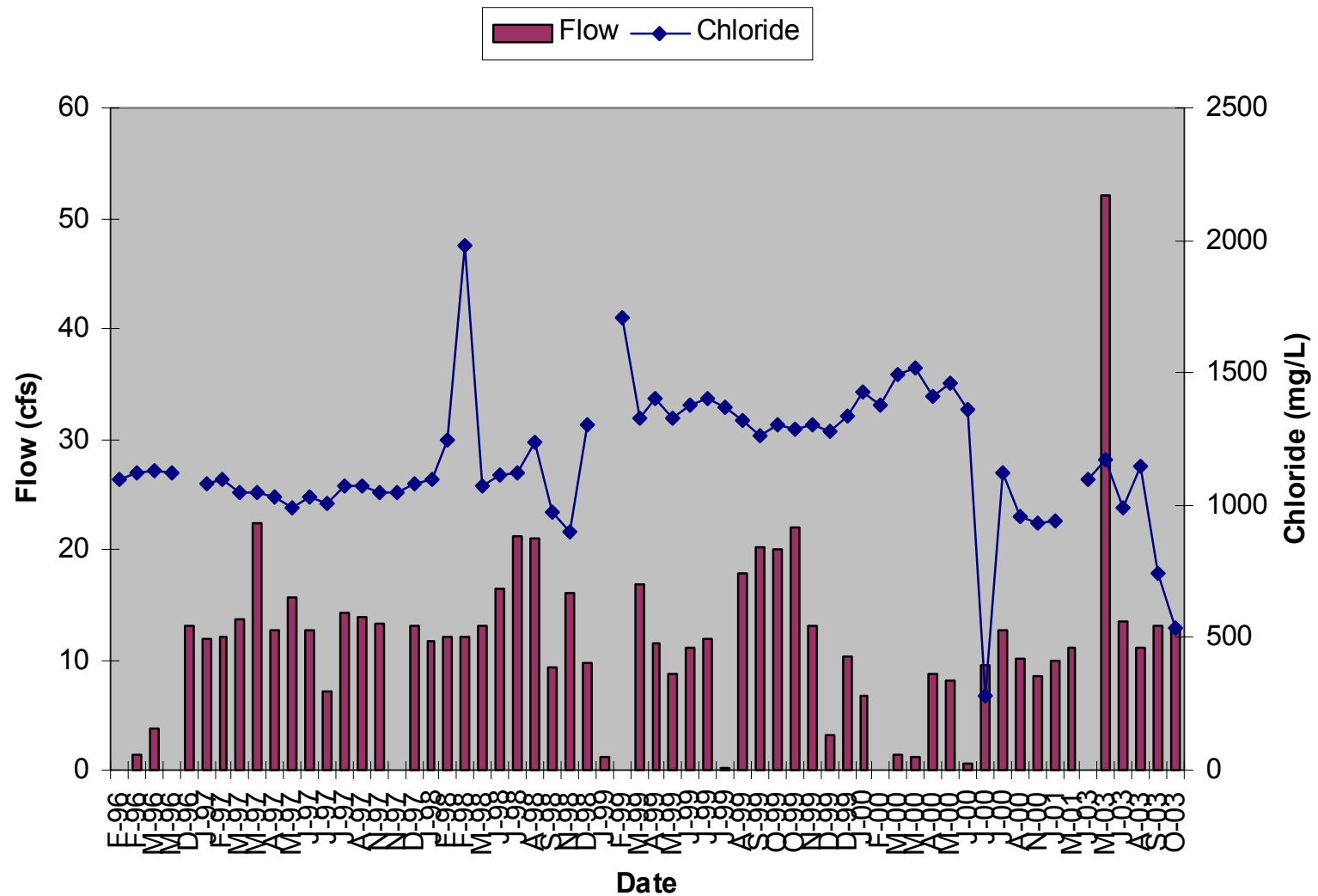
Colorado River (Station 12432)



Colorado River (Station 15147)



Colorado River (Station 15147)



Source Loading Estimates

"Total Available Load"

Sources Loading Estimates

- Determine the daily pollutant production by source
- Estimate the size/number of each source
- Determine whether the source is
 - Direct Source
 - Indirect Source
- Calculate the load to each land use based on a monthly schedule and for each source
- The sum of all the individual sources is the total load

Next Steps

- Identify data needs
- Collect available data
- Analyze data to investigate the impairment in the watershed
- Source loading estimates
- Develop the watershed model input parameters
- Prepare for the Public Meeting

Local TMDL Contacts

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